

MEDfacts

An Educational Health Series From National Jewish Health®



High Cholesterol (Dyslipidemia)

What is high cholesterol?

Cholesterol is a type of fat that is found in every cell in the body. It is used to build healthy cells and some vital hormones. High levels of cholesterol in the blood (high blood cholesterol) can be serious because it can cause fatty deposits, called plaque, to build up in arteries, making blood flow more difficult. High blood cholesterol can be secondary to many diseases and can contribute to many forms of disease, most notably cardiovascular disease, or heart disease.

There are often no signs or symptoms of high blood cholesterol. Many people don't know that their cholesterol level is too high. Everyone age 20 and older should have their cholesterol levels checked at least once every 5 years. You and your doctor can discuss how often you should be tested.

Why does it happen?

A high level of cholesterol in the blood is due to abnormal levels of lipoproteins. These are the particles that carry cholesterol in the bloodstream. This may be related to:

- Diet ,
- Weight ,
- Lack of physical activity ,
- Genetic factors and
- Presence of other diseases (diabetes, underactive thyroid, etc.).

What are these cholesterol particles and types?

The types of cholesterol and lipoproteins include:

- **Low-Density Lipoprotein (LDL) or Bad Cholesterol Plaque Builder**
When too much LDL circulates in the blood, it can slowly build up in the inner walls of the arteries that feed the heart and brain. Together with other substances, it can form plaque (or atheroma).

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This is a thick, hard deposit that can narrow the arteries and make them less flexible. This condition is known as atherosclerosis. As the artery narrows and hardens, less blood can get through causing ischemia, or a lack of necessary nutrients. If a clot or blockage forms in a narrowed artery, heart attack or stroke can result.

- **High-Density Lipoprotein (HDL) or Good Cholesterol - The Bad Cholesterol Eater**
About one-fourth to one-third of blood cholesterol is carried by HDL. HDL cholesterol is known as "good" cholesterol, because high levels of HDL seem to protect against heart attack. Low levels of HDL (less than 40 mg/dL) also increase the risk of heart disease. HDL tends to carry cholesterol away from the arteries and back to the liver, where it's passed from the body—in a way it "eats" up the bad cholesterol. Some experts believe that HDL removes excess cholesterol from arterial plaque, slowing its buildup.
- **Triglycerides - Blood Fats**
Triglyceride is a form of fat made in the body. Elevated triglycerides can be due to overweight/obesity, physical inactivity, cigarette smoking, excess alcohol consumption and a diet very high in carbohydrates (60 percent of total calories or more). Many times, people with [diabetes](#) have high triglycerides when their blood sugar is not well controlled. People with high triglycerides often have a high total cholesterol level, including a high LDL (bad) level and a low HDL (good) level. Many people with heart disease and/or diabetes also have high triglyceride levels.
- **Lp(a) Cholesterol**
Lp(a) is a genetic variation of LDL (bad) cholesterol. A high level of Lp(a) is a significant risk factor for the premature development of fatty deposits in arteries. Lp(a) isn't fully understood, but it may interact with substances found in artery walls and contribute to the buildup of fatty deposits.

How is High Cholesterol Diagnosed?

High blood cholesterol is diagnosed by a blood test called a lipoprotein profile. This requires fasting. You cannot eat or drink anything for 9 to 12 hours before taking the test. The lipoprotein profile provides information about:

- Total cholesterol,
- Low-density lipoprotein (LDL) level or bad cholesterol,
- High-density lipoprotein (HDL) level or good cholesterol and
- Triglycerides.

If it is not possible to get a lipoprotein profile done, knowing your total cholesterol and HDL cholesterol can give you a general idea about your cholesterol levels.

How is High Cholesterol Treated?

High cholesterol levels are treated with diets low in cholesterol, medications and [lifestyle modifications](#). There is also increased emphasis on other risk factors for cardiovascular disease, such as high blood pressure. Treatment most often includes lifestyle changes. Lifestyle changes include:

- Increasing exercise,

- Avoiding excess carbohydrates and fatty foods and
- Decreasing animal products in the diet.

If these lifestyle changes don't produce the necessary result, your doctor may use medications such as statins (HMG CoA reductase inhibitors) to reduce LDL and boost HDL cholesterol. There are also many other medications and supplements to help with cholesterol.

Medication treatment controls, but does not "cure" high blood cholesterol. Therefore, you must continue taking your medicine to keep your cholesterol level in the recommended range.

The five major types of cholesterol-lowering medicines are:

- **Statins**
Lowers LDL and cholesterol
- **Bile Acid Sequestrants**
Lowers LDL and cholesterol
- **Nicotinic Acid**
Lowers LDL ,cholesterol and triglycerides, Raises HDL and cholesterol.
- **Fibrates**
Lowers triglycerides and may increase HDL and cholesterol
- **Ezetimibe**
Lowers LDL and cholesterol

What are Treatment Goals

Treatment is tailored to your individual risk of developing heart disease. Some people need to have an LDL less than 100 or even 70 mg/dL, but you and your doctor can work on these plans together. Below is just one example of some treatment goals. As always, consult your doctor for complete information on your individual needs.

Adult treatment panel III classification of LDL, total, and HDL cholesterol



LDL cholesterol, mg/dL (mmol/L)	
<100 (2.58)	Optimal
100 to 129 (2.58 to 3.33)	Near or above optimal
130 to 159 (3.36 to 4.11)	Borderline high
160 to 189 (4.13 to 4.88)	High
≥190 (4.91)	Very high
Total cholesterol, mg/dL (mmol/L)	
<200 (5.17)	Desirable
200 to 239 (5.17 to 6.18)	Borderline High
≥240 (6.20)	High
HDL cholesterol, mg/dL (mmol/L)	
<40 (1.03)	Low
≥60 (1.55)	High

Adapted from Adult Treatment Panel III at <http://www.nhlbi.nih.gov/>.

Tips to Keep a Healthy Heart

While carbohydrates now occupy a lot of attention, cholesterol remains an important determinant of cardiovascular disease. Cholesterol is, in fact, a necessary building block for producing hormones, cellular membranes, and digestive acids. However, the vast majority of us eat a lot more cholesterol than we need. Cholesterol, as we refer to it, is composed of three different groups: LDL (low density lipoprotein, or "bad" cholesterol), HDL (high density cholesterol, or "good" cholesterol) and triglycerides. High LDL, low HDL, and elevated triglyceride levels are all associated with plaque development in the arteries, which can lead to heart attack and stroke.

While cholesterol-lowering medications are generally safe and effective, a heart-healthy lifestyle can significantly reduce your cholesterol levels, in some cases in place of medication. Here are a some tips to help you in your efforts to go heart-healthy:

- **Avoid Bad Fats.** Saturated and trans-fats both raise LDL ("bad" cholesterol) levels. Saturated fats are found mainly in animal products (red meat, whole milk, butter and cheese) and tropical oils (coconut, palm and tropical oils). Trans-fats are typically found in margarines, baked goods, or anything containing "partially hydrogenated vegetable oil." The American Heart Association (AHA) recommends keeping fat intake to less than 25-35 percent of total caloric intake, saturated fat to less than 7 percent, and trans-fats to less than 1 percent. Keep in mind 2 slices of bacon have 17 grams of saturated fat. Surprisingly, dietary fat intake may have a greater impact on blood cholesterol levels than cholesterol itself. While the AHA recommends that healthy people limit cholesterol intake to 300 mg of cholesterol/day, it recently acknowledged an egg (217 mg of cholesterol) a day may be healthy provided other sources of cholesterol are minimized.
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- **Increase Good Fats.** Previous efforts to characterize fat as unhealthy neglected the positive benefits of "good fats" best demonstrated by the Mediterranean diet. Mono- and polyunsaturated fats, such as those found in olive oil, canola oil, and nuts, can be helpful to your lipid profile. Walnuts and almonds can lower LDL cholesterol by as much as 12 percent while raising HDL ("good" cholesterol). Keep in mind nuts can also be high in calories, so a handful a day is plenty.
- **Omega-3 Fatty Acids.** [Omega-3 fatty acids](#) can lower triglycerides by 25-30 percent while modestly elevating HDL. Since omega 3 fatty acids are not produced by the body, we are dependent on marine sources (salmon, herring and fish oil supplements), plant sources (soy, canola and flax seed oils) and food sources (walnuts and flaxseeds) which are rich in the most healthy omega 3's, EPA and DHA. The AHA recommends eating 2 servings/week of fish while enriching your diet with plant sources of omega 3's. Fish is preferred over fish oil capsules, but supplements can be utilized when necessary.
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Keep in mind that high dose omega 3's can also increase LDL.

- **Increase Your Fiber Intake.** Soluble fiber lowers the absorption of cholesterol in the intestines. Eat at least 25 to 30 grams of soluble fiber a day. A cup and half of cooked oatmeal contains 6 grams of fiber. Other excellent sources of soluble fiber include bran, bananas, kidney beans and vegetables.



- **Exercise.** Exercise can raise HDL about 5 percent within 2 months of starting a program while lowering triglycerides. Increasing your HDL can in turn lower your LDL. Moderate-intensity, aerobic activity is best. Aim for 30 minutes/day, 5 days/week. Be sure to include at least two days/week of strength building exercise to maintain muscle endurance. Remember to consult your doctor before starting an exercise program.
- **Weight Loss.** Excess weight lowers HDL and raise triglycerides; weight loss tends to raise HDL and lower triglycerides.
- **Give Up Smoking.** We all know that smoking is bad for your heart. What you may not know is that smoking lowers HDL, which in turn can raise LDL.
- **Margarine and Plant Sterols/Stanols.** It was not that long ago that margarine was loaded with trans fats. Trans-fats are felt to be so unhealthy New York city now outlaws their use in restaurants. Many margarines are now not only trans fat-free but also contain heart healthy plant stanols and sterols. Plant sterols and stanols (essential components of plant membranes) are structurally similar to cholesterol, thereby reducing intestinal absorption of cholesterol. Two grams a day, or roughly 2 tablespoons/day of a sterol/stanol-enriched butter-substitute can lower LDL by 5 to 15 percent. Yogurt and mayonnaise can also be enriched sources of stanols and sterols.
- **Watch the Alcohol.** The information surrounding alcohol and heart disease can be confusing for patients and doctors alike. On the one hand, alcohol (in moderation) can raise HDL while reducing the risk of heart attack and stroke. However, significant alcohol intake can fuel high triglycerides and cause liver problems, particularly if you take cholesterol-lowering medications. If you have high triglycerides, it's best to minimize if not avoid alcohol altogether.
- **Cholesterol Medications.** Cholesterol medications are not just for people with high cholesterol. In fact, people with normal cholesterol may still benefit from cholesterol medication. Plaque development in the arteries is an inflammatory disease, and C reactive protein (or CRP) is elevated by inflammation. In a recent study involving people with normal cholesterol but CRP levels, subjects who received a statin medication had fewer heart attacks, strokes, and cardiovascular deaths than those taking placebo. Because of this study, it may be worth checking CRP in people with normal cholesterol to see if they would merit treatment with statin medication.

What do we do at National Jewish Health?

We provide comprehensive cardiology evaluation and consultation and non-invasive cardiac testing. We evaluate and treat heart problems such as coronary artery disease, high blood pressure, high cholesterol, heart valve problems and heart failure. In addition to traditional heart problems, we offer expertise in many other focus areas, including evaluation of patients with shortness of breath with exercise, sarcoid of the heart, diastolic dysfunction and secondary pulmonary hypertension.

Why National Jewish Health?

At National Jewish Health, we treat the whole person, not just the disease. Our cardiology team works with healthcare providers from all areas of the medical center, including rehabilitation therapists, dietitians and clinical researchers.

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